CHAPTER 2

DESCRIPTION OF THE UPPER DUCK RIVER WATERSHED

2.1. BACKGROUND. The Duck River was first settled about 8,000 years ago, but its modern name originated from early surveyors who recognized the abundant waterfowl in the Duck River valley. Much of the watershed, especially in the Yanahli area, was considered prime hunting ground by Cherokee and Chickasaw tribes, as well as by the first settlers. The Duck River flows through some of the most scenic landscapes and least populated counties in Tennessee.

This Chapter describes the location and characteristics of the Upper Duck River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Upper Duck River Watershed is located in Middle Tennessee and includes parts of Bedford, Coffee, Franklin, Giles, Lincoln, Marshall, Maury, Moore, Rutherford, and Williamson Counties.

Figure 2-1. General Location of the Upper Duck River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Bedford	39.4
Marshall	22.9
Coffee	20.8
Maury	12.6
Williamson	1.2
Rutherford	0.8
Giles	0.7
Franklin	0.2
Lincoln	0.2
Moore	0.1

Table 2-1. The Upper Duck River Watershed Includes Parts of Ten Middle Tennessee Counties.

2.2.B. Population Density Centers. Seven state highways and two interstates serve the major communities in the Upper Duck River Watershed.

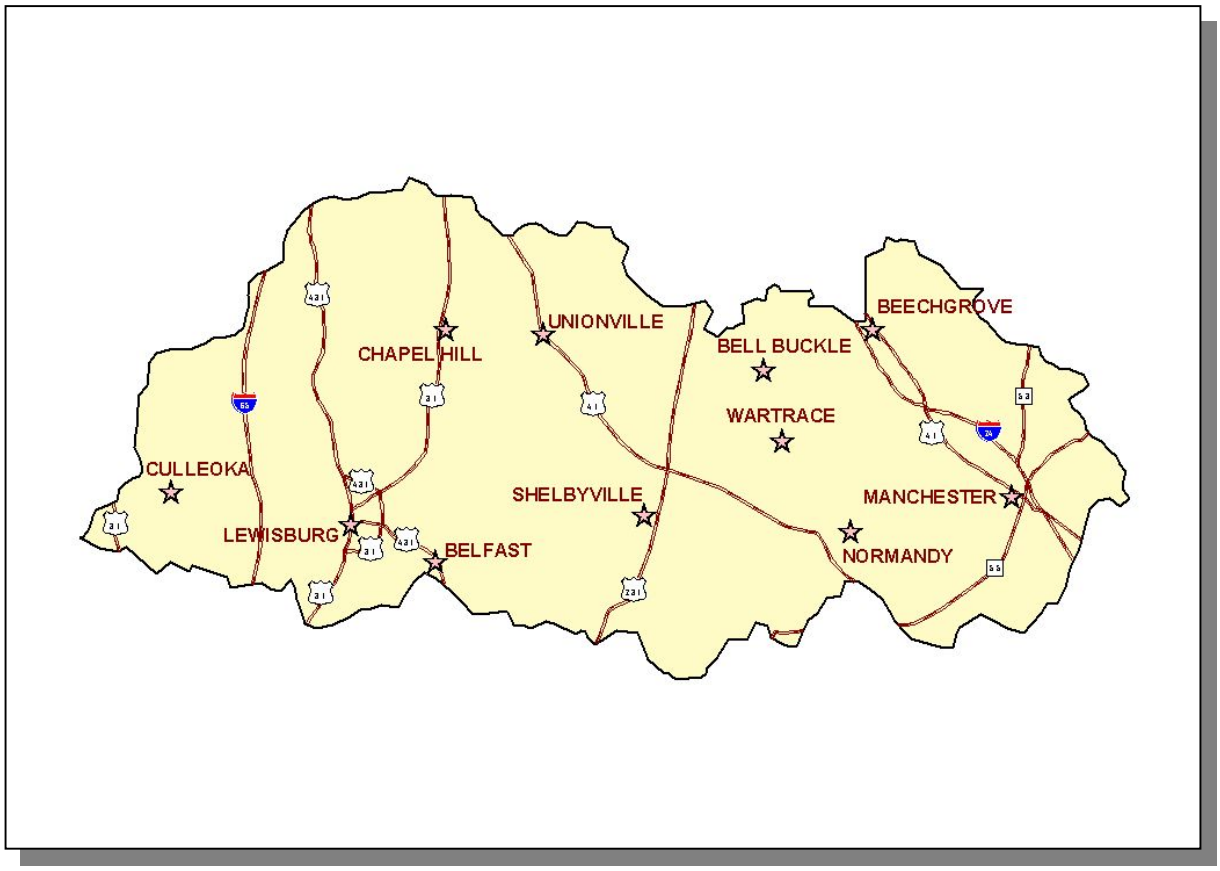

Figure 2-2. Municipalities and Roads in the Upper Duck River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Shelbyville*	17,003	Bedford
Lewisburg*	11,337	Marshall
Manchester*	9,888	Coffee
Chapel Hill	1,049	Marshall
Wartrace	537	Bedford
Bell Buckle	364	Bedford
Normandy	126	Bedford

Table 2-2. Communities and Populations in the Lower Duck River Watershed. *Population based on 1999 census (Tennessee 2001/2002 Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Upper Duck River Watershed, designated 06040002 by the USGS, drains approximately 1,182 square miles and empties to the Lower Duck River Watershed (06040003).

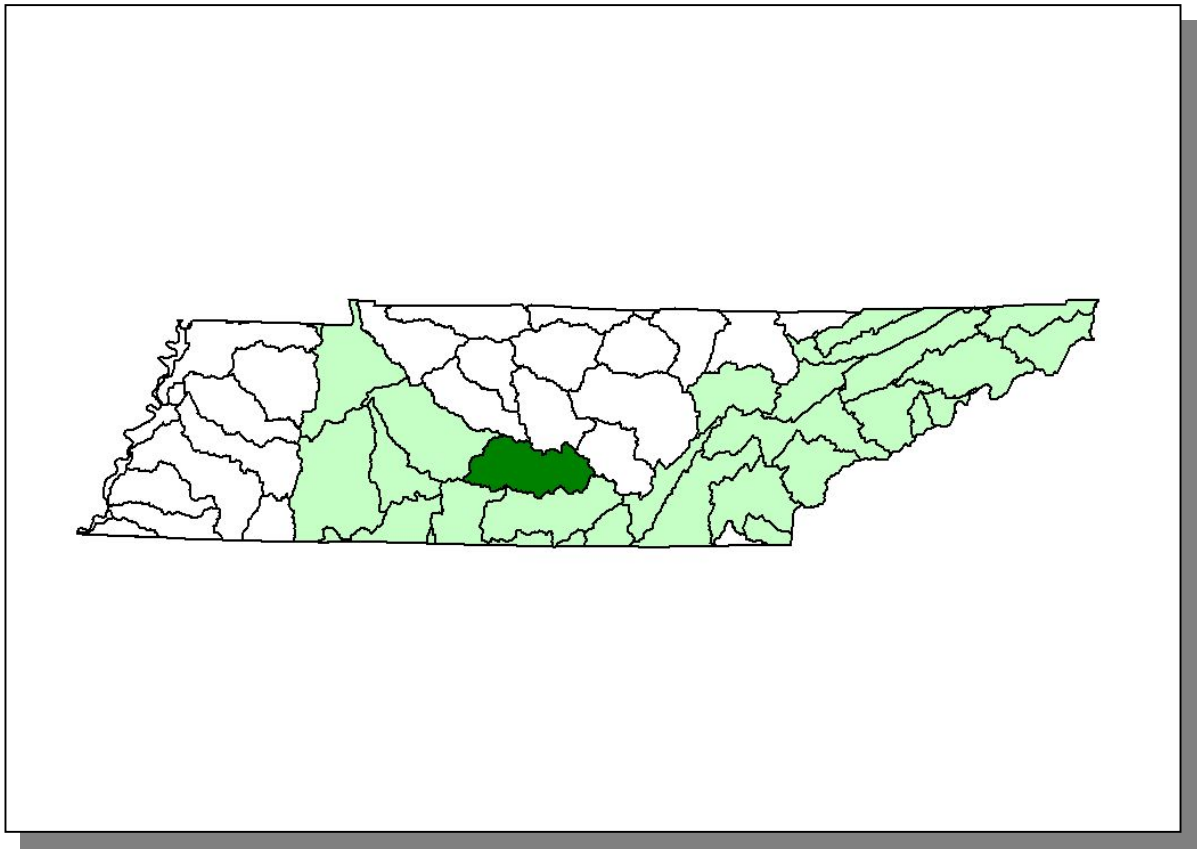

Figure 2-3. The Upper Duck River Watershed is Part of the Tennessee River Basin.

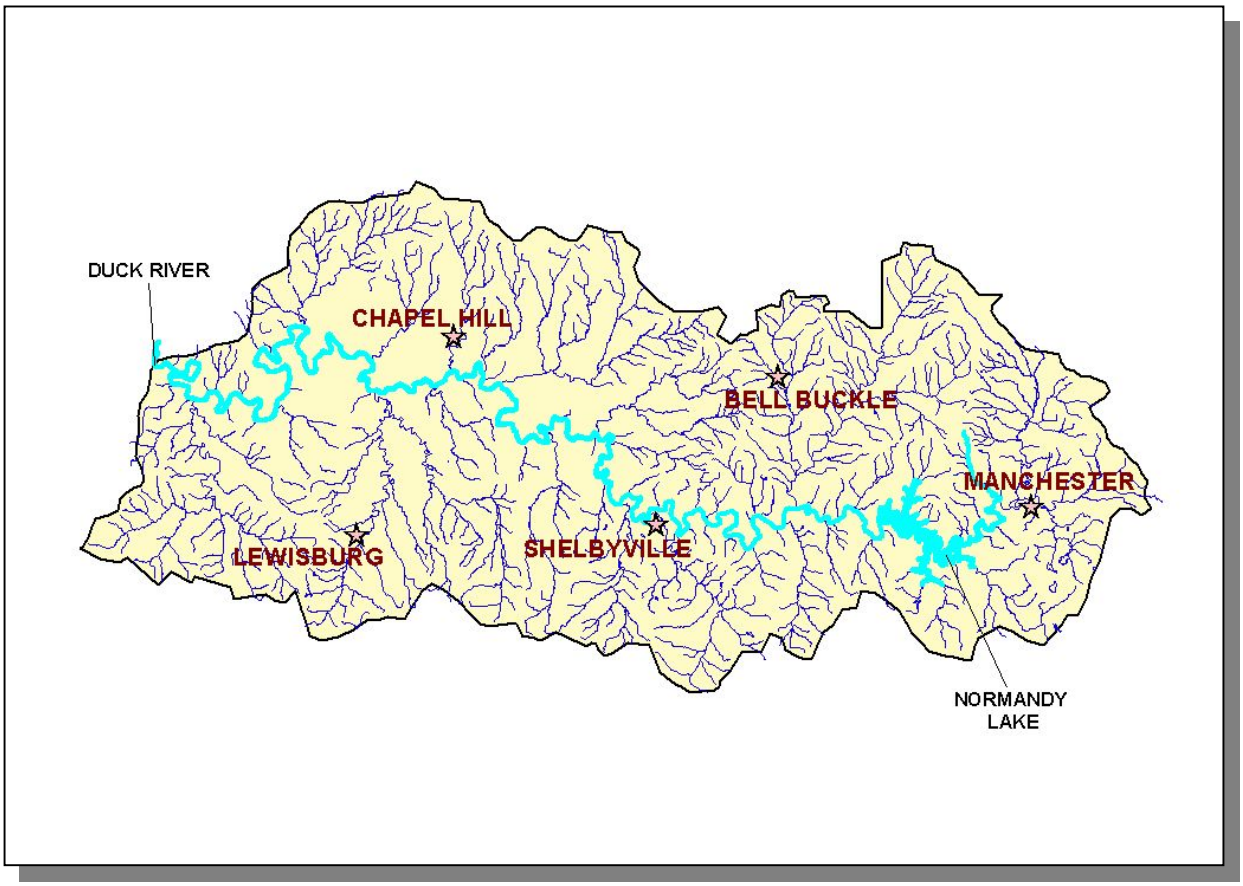

Figure 2-4. Hydrology in the Upper Duck River Watershed. *There are 1,607 stream miles and 3,260 lake acres in the Upper Duck River Watershed as catalogued in the assessment database. Location of the Duck River and Normandy Lake, and the cities of Bell Buckle, Chapel Hill, Lewisburg, Manchester, and Shelbyville are shown for reference.*

2.3.B. Dams. There are 18 dams inventoried by TDEC Division of Water Supply in the Upper Duck River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

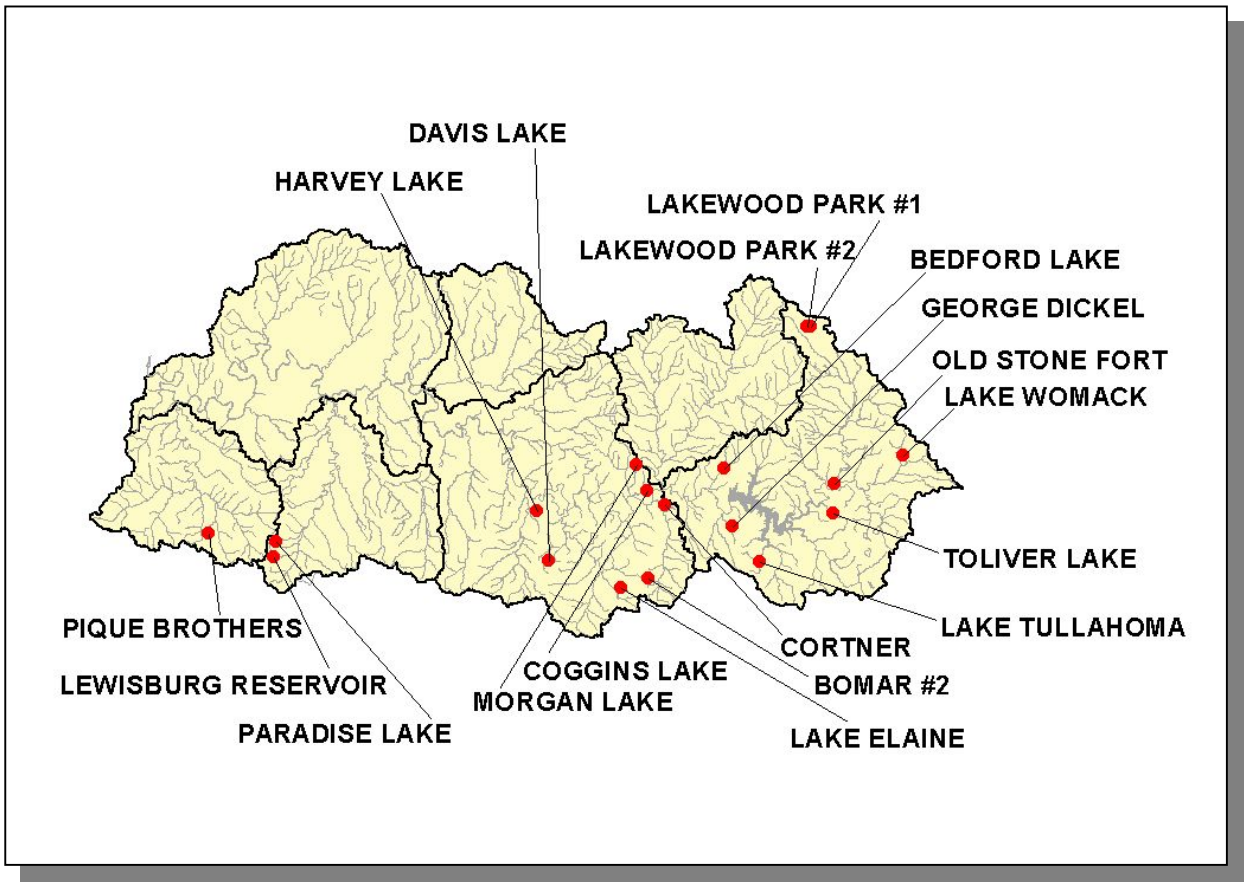

Figure 2-5. Location of Inventoried Dams in the Upper Duck River Watershed. *More information is provided in Appendix II and on the TDEC homepage at http://gwidc.memphis.edu/website/dws/.*

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 1992 Multi-Resolution Land Cover (MRLC) satellite imagery.

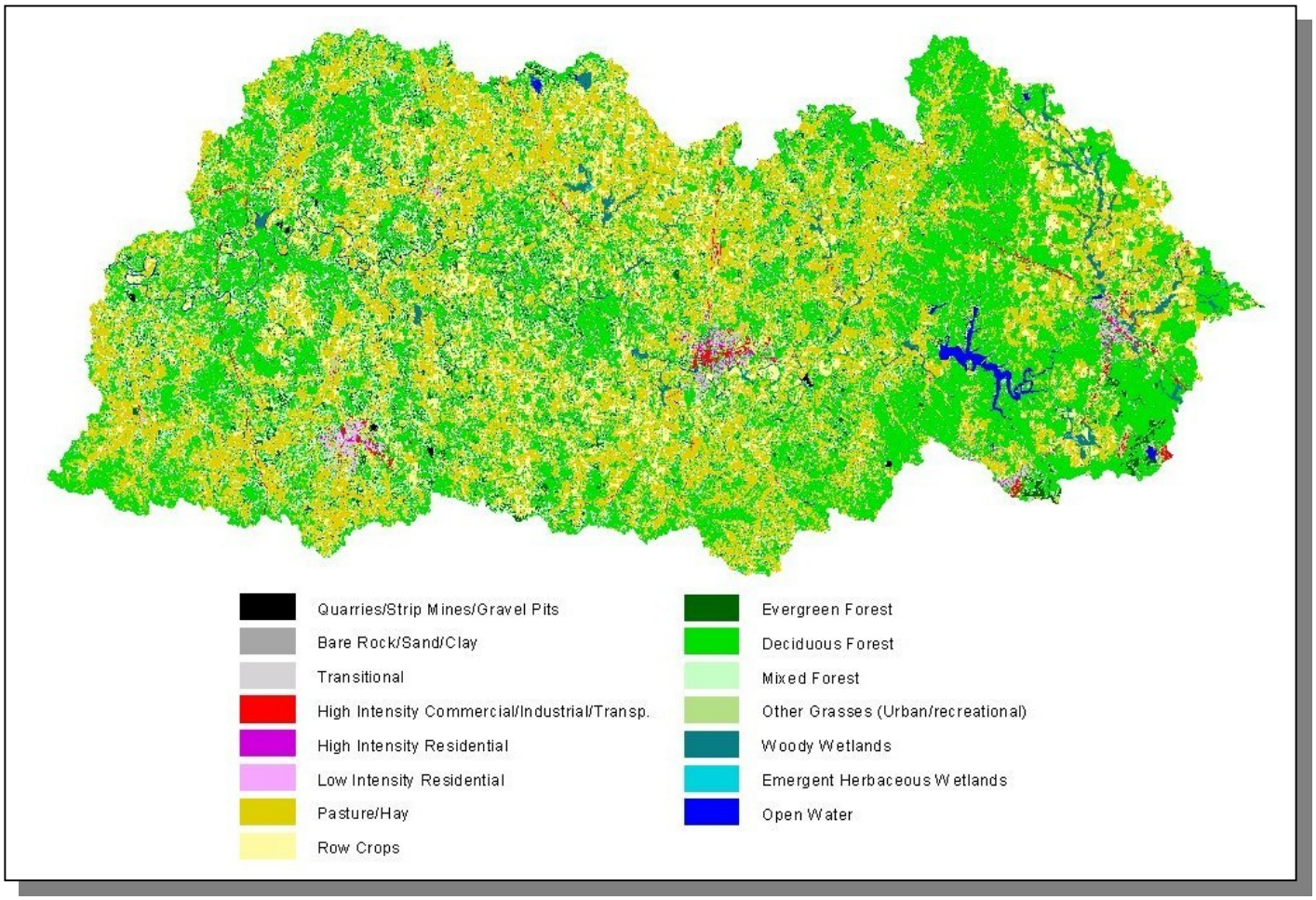

Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery in the Upper Duck River Watershed.

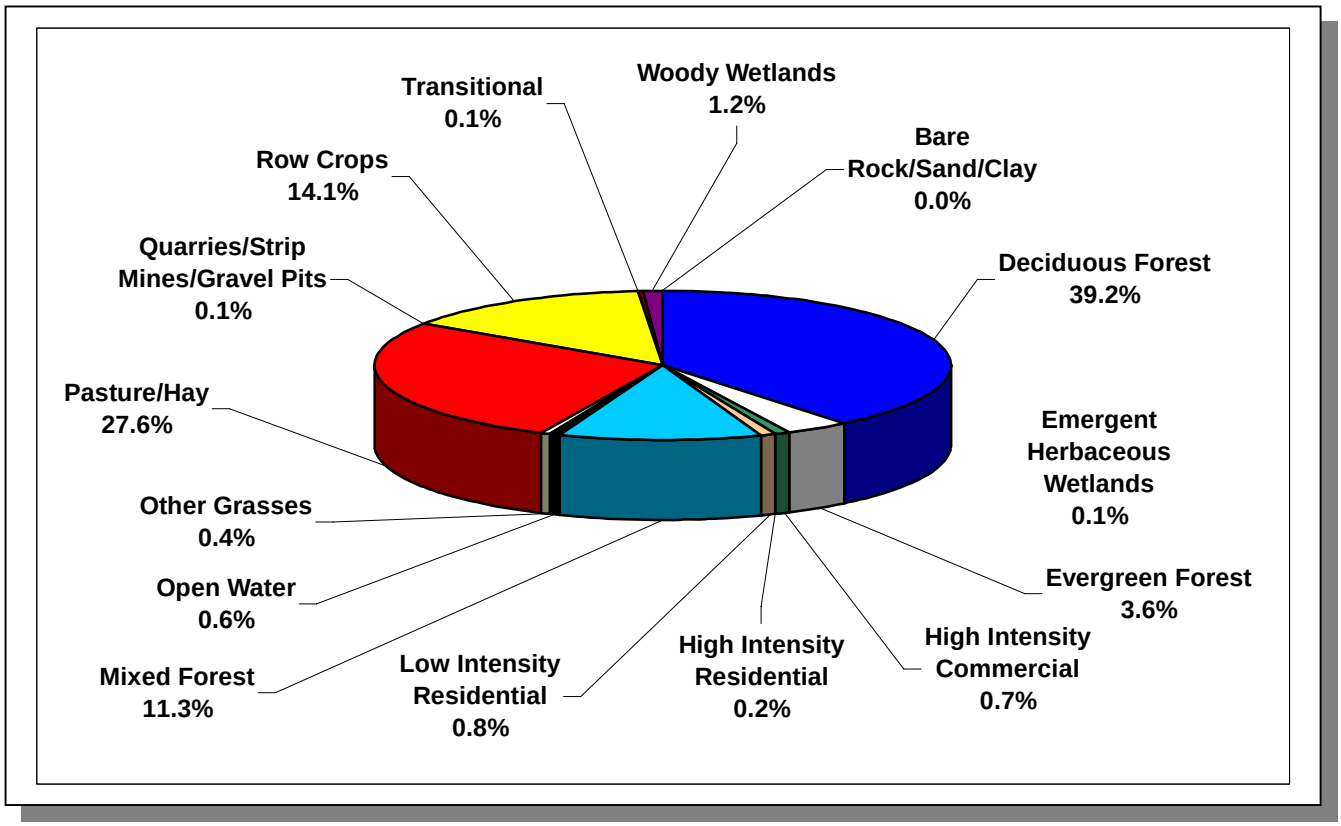

Figure 2-7. Land Use Distribution in the Upper Duck River Watershed. *More information is provided in Appendix II.*

Sinkholes, springs, disappearing streams and caves characterize karst topography. The term “karst” describes a distinctive landform that indicates dissolution of underlying soluble rocks by surface water or ground water. Although commonly associated with limestone and dolomite (carbonate rocks), other highly soluble rocks such as gypsum and rock salt can be sculpted into karst terrain. In karst areas, the ground water flows through solution-enlarged channels, bedding planes and microfractures within the rock. The characteristic landforms of karst regions are: closed depressions of various size and arrangement; disrupted surface drainage; and caves and underground drainage systems. The term “karst” is named after a famous region in the former country of Yugoslavia.

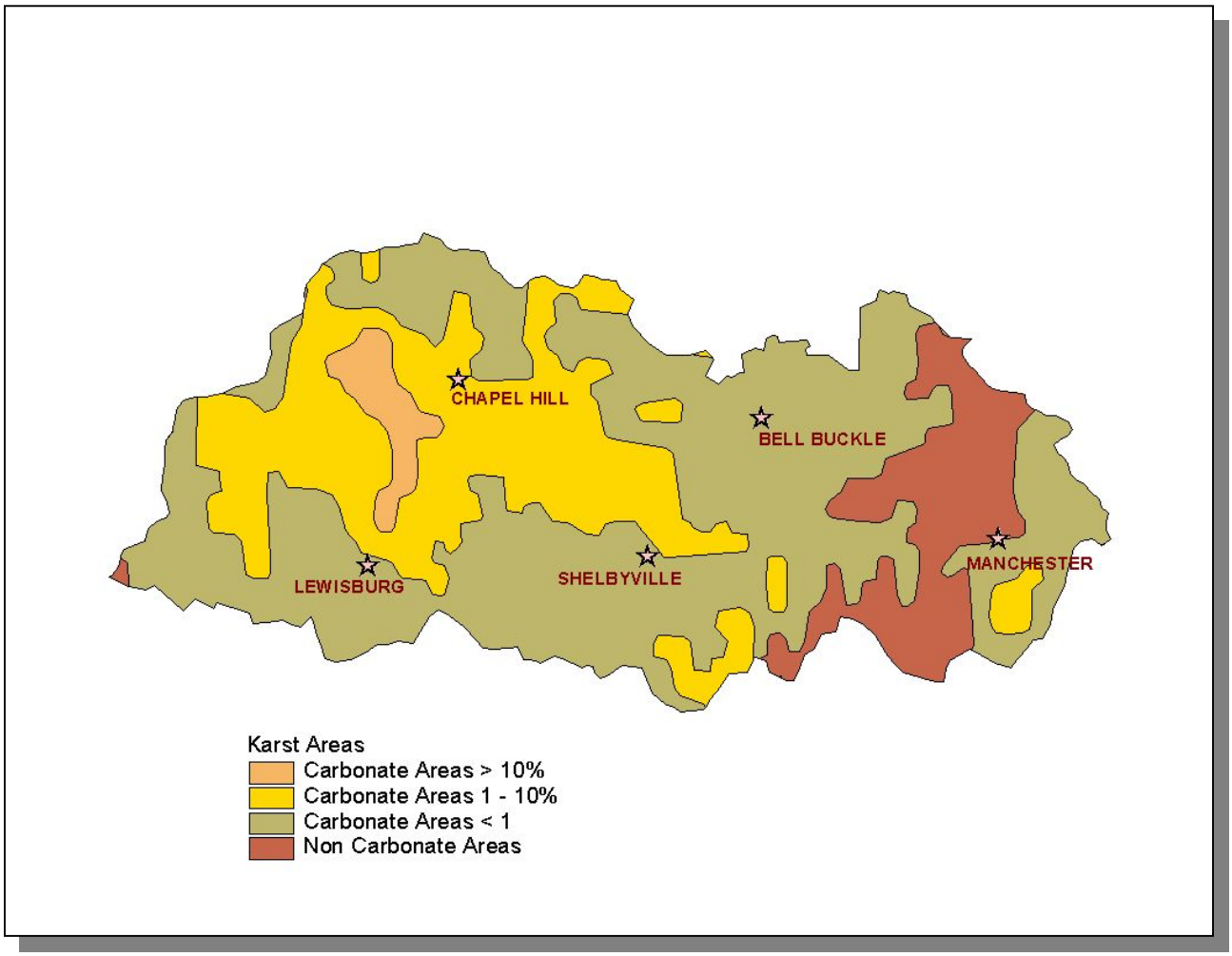

Figure 2-8. Illustration of Karst Areas in Upper Duck River Watershed. *Locations of Bell Buckle, Chapel Hill, Lewisburg, Manchester, and Shelbyville are shown for reference.*

2.5. ECOREGIONS AND REFERENCE STREAMS. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plant and animal life. Ecoregions serve as a spatial framework for the assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregion studies can aid the selection of regional stream reference sites, identifying high quality waters, and developing ecoregion-specific chemical and biological water quality criteria.

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Upper Duck River Watershed lies within a single Level III ecoregion (Interior Plateau) and contains 4 Level IV subecoregions:

- **Western Highland Rim (71f)** is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty and acidic with low to moderate fertility. Streams are relatively clear with a moderate gradient. Substrates are coarse chert, gravel and sand with areas of bedrock. The native oak-hickory forests were removed over broad areas in the mid-to late 1800's in conjunction with the iron-ore related mining and smelting of the mineral limonite, however today the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys. The predominant land uses are hay, pasture, and cattle with some cultivation of corn and tobacco.

- **Eastern Highland Rim (71g)** has more level terrain than the Western Highland Rim (71f), with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale and dolomite predominate. Karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna typify the region. Natural vegetation is transitional between the oak-hickory forests to the west and the mixed mesophytic forests of the Appalachian ecoregions (68, 69) to the east. Bottomland hardwoods forests were once abundant in some areas, although much of the original bottomland forest has been inundated by several large impoundments. Barrens and former prairie areas are now primarily oak thickets, pasture or cropland.

- **Outer Nashville Basin (71h)** is a more heterogeneous region than the Inner Nashville Basin (71I), with rolling and hilly topography with slightly higher elevations. The region encompasses most of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian-age formation, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forest with pasture and cropland are the dominant land covers. The region has areas of intense urban development with the city of Nashville occupying the northwest region. Streams are low to moderate gradient, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin has a distinctive fish

population, notable for species that avoid the region, as well as those that are present.

- **Inner Nashville Basin (71i)** is less hilly and lower than the Outer Nashville Basin (71h). Outcrops of the Ordovician-age limestone are common. The generally shallow soils are redder and lower in phosphorous than those of the outer basin. Streams are lower gradient than surrounding regions, often flowing over large expanses of limestone bedrock. The most characteristic hardwoods within the inner basin are a maple-oak-hickory-ash-association. The limestone cedar glades of Tennessee, a unique mixed grassland/forest cedar glades vegetation type with many endemic species, are located primarily on the limestones of the Inner Nashville Basin. The more xeric, open characteristics and shallow soils of the cedar glades also result in a distinct distribution of amphibian and reptile species. Urban, suburban, and industrial land use in the region is increasing.

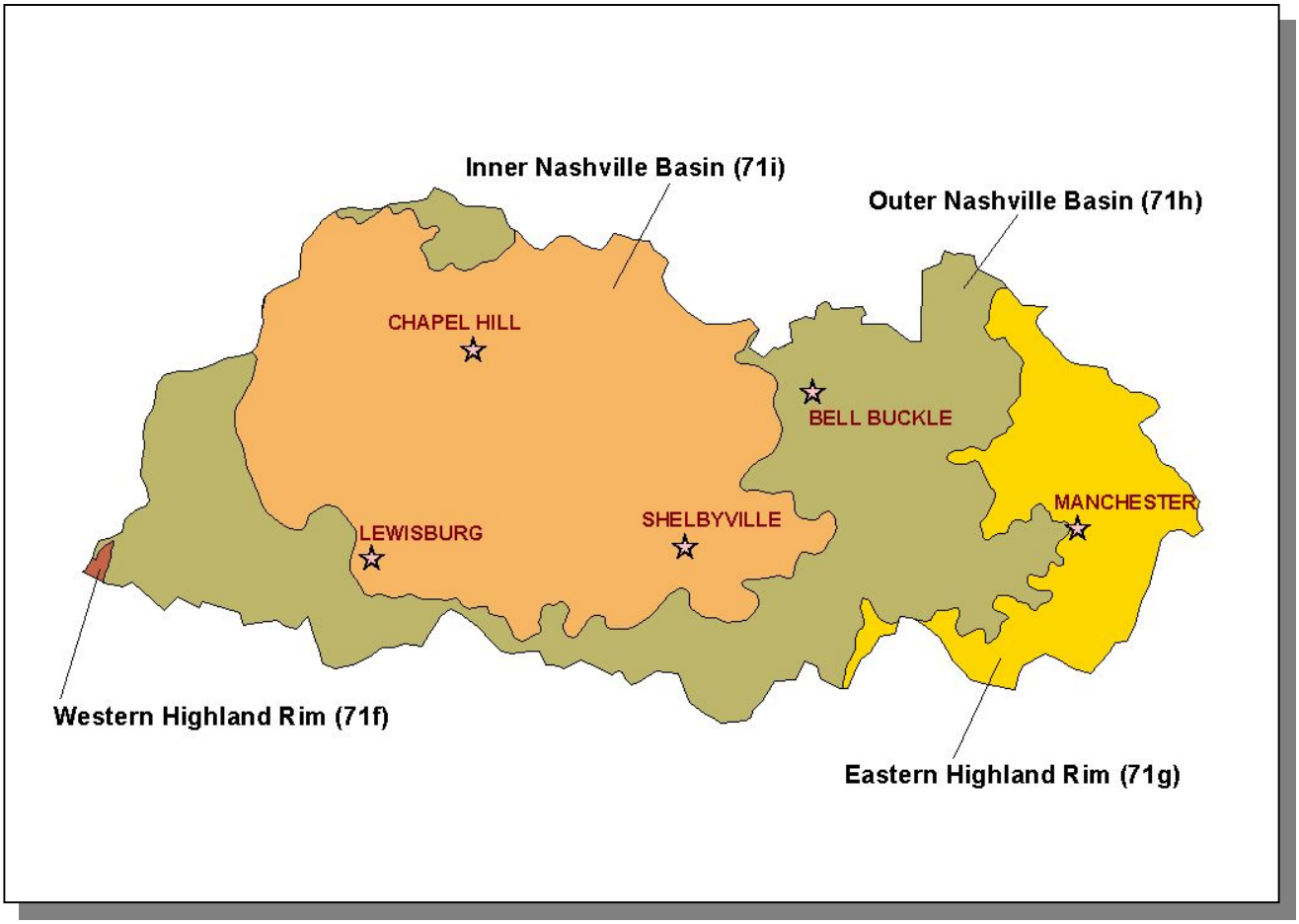

Figure 2-9. Level IV Ecoregions in the Upper Duck River Watershed. *Locations of Bell Buckle, Chapel Hill, Lewisburg, Manchester, and Shelbyville are shown for reference.*

Each Level IV Ecoregion has at least one reference stream associated with it. A reference stream represents a least impacted condition and may not be representative of a pristine condition.

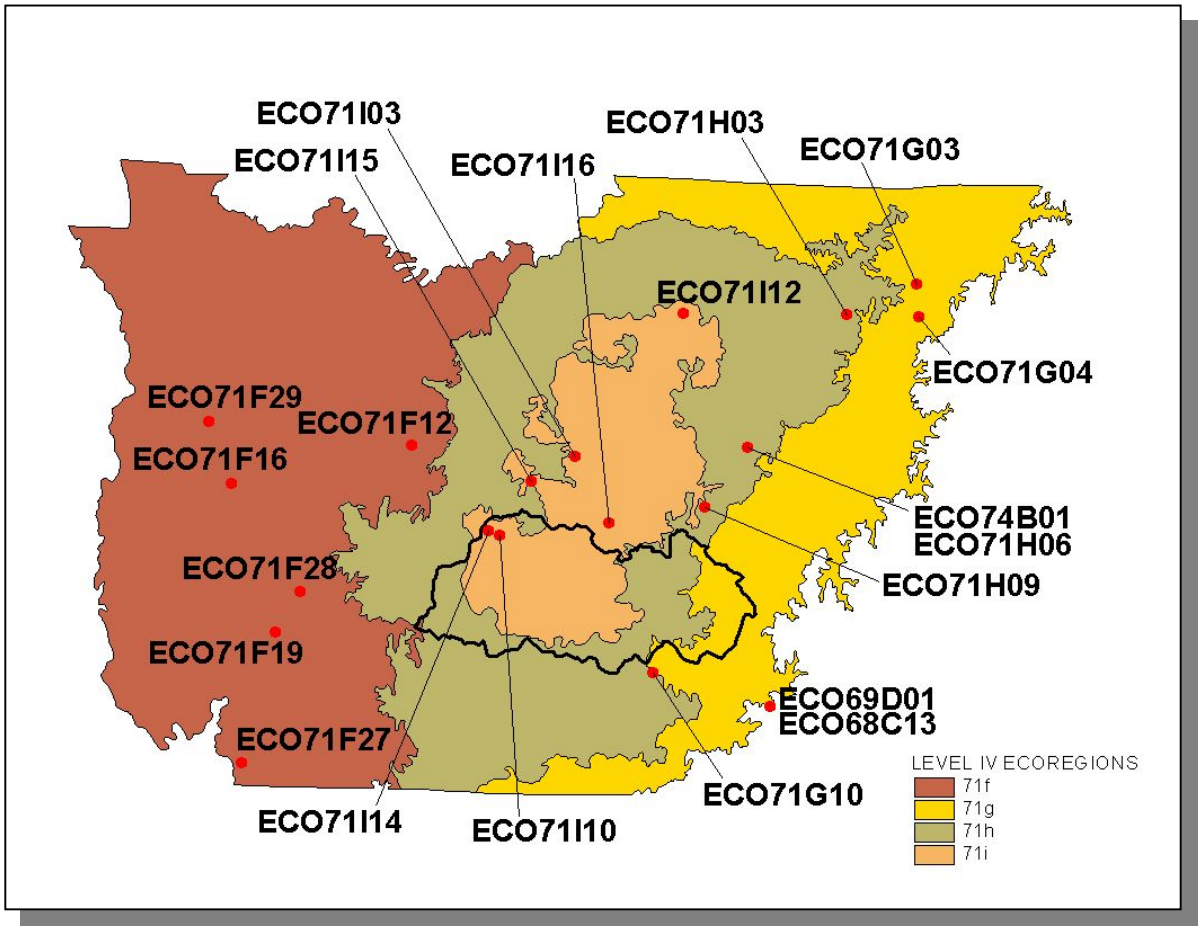

Figure 2-10. Ecoregion Monitoring Sites in Level IV Ecoregions 71f, 71g, 71h, and 71i. *The Upper Duck River Watershed boundary is shown for reference. More information is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service, and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Insects and Spiders	2
Mussels	15
Snails	5
Amphibians	4
Birds	3
Fish	14
Mammals	6
Reptiles	1
Plants	97
Total	**147**

Table 2-3. There are 147 Known Rare Plant and Animal Species in the Upper Duck River Watershed.

In the Upper Duck River Watershed, there are 14 rare fish species, 19 rare mussel species, and 9 rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Etheostoma aquali	Coppercheek Darter	MC	T
Etheostoma cinereum	Ashy Darter	MC	T
Etheostoma denoncourti	Golden Darter		
Etheostoma forbesi	Barrens Darter	MC	E
Etheostoma luteovinctum	Redband Darter		D
Etheostoma striatulum	Striated Darter	MC	T
Fundulus julisia	Barrens Topminnow	MC	E
Hemitremia flammea	Flame Chub	MC	D
Notropus rupestris	Bedrock Shiner		D
Noturus sp 3	Saddled Madtom		T
Percina burtoni	Blotchside Darter	MC	D
Percina macrocephala	Longhead Darter		T
Percina phoxocephala	Slenderhead Darter		D
Typhlichthys subterraneus	Southern Cavefish	MC	D
Conradilla caelata	Birdwing Pearly Mussel	LE	E
Epioblasma brevidens	Cumberland Combshell	LE	E
Epioblasma capsaeformis	Oyster Mussel	LE	E
Epioblasma florentina walkeri	Tan Riffleshell	LE	E
Epioblasma triquetra	Snuffbox		
Lexingtonia dolabelloides	Slabside Pearly Nussel	C	
Obovaria subrotunda	Round Hickorynut		
Plethobasus cooperianus	Orange-Foot Pimpleback	LE	E
Pleurobema oviforme	Tennessee Clubshell		
Pleurobema rubrum	Pyramid Pigtoe		
Quadrula cylindria cylindrica	Rabbitsfoot		
Quadrula intermedia	Cumberland Monkeyface	LE	E
Toxolasma cylindrellus	Pale Lilliput	LE	E
Toxolasma lividum	Purple Lilliput		
Villosa fabalis	Rayed Bean		
Lithasia duttoniana	Helmet Rocksnail		
Lithasia geniculata fulginosa	Geniculate Riversnail		
Lithasia geniculata pinguis	Small Geniculate Riversnail		
Lithasia salebrosa	Rustic Rocksnail		
Polygyra auriformis	Rockpile Liptooth		

Table 2-4. Rare Aquatic Species in the Upper Duck River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service; MC, Management Concern for U.S. Fish and Wildlife Service; C, Candidate species proposed for listing by the U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; T, Listed Threatened by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/nh/data.php.*

2.6.B. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of Tennessee's Wetland Strategy, which is described at:

http://www.state.tn.us/environment/nh/wetlands/

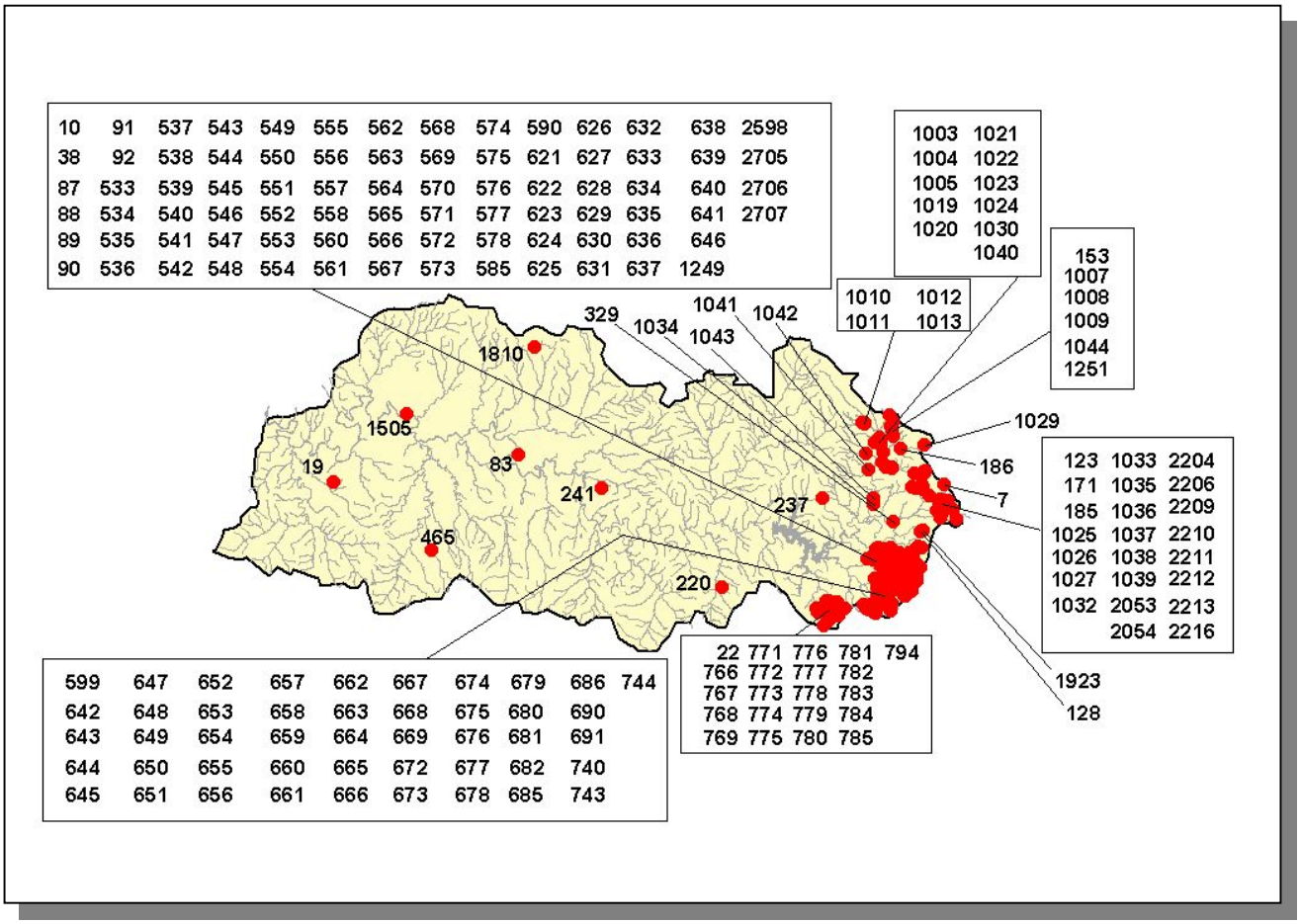

Figure 2-11. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Upper Duck River Watershed. This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands*. More information is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. State Scenic River. A portion of the Upper Duck River has been designated as a State Scenic River. The segment from Iron Bridge Road (in the Lower Duck River Watershed) upstream to the Marshall County line has been designated as a Class II Pastoral River Area. The Tennessee Scenic Rivers Act of 1968, as amended, defines Class II State Scenic Rivers as streams that flow through agricultural areas or lands used for dispersed human activities. More information about Tennessee's State Scenic River Program may be found at:

http://www.state.tn.us/environment/nh/scenicrivers/

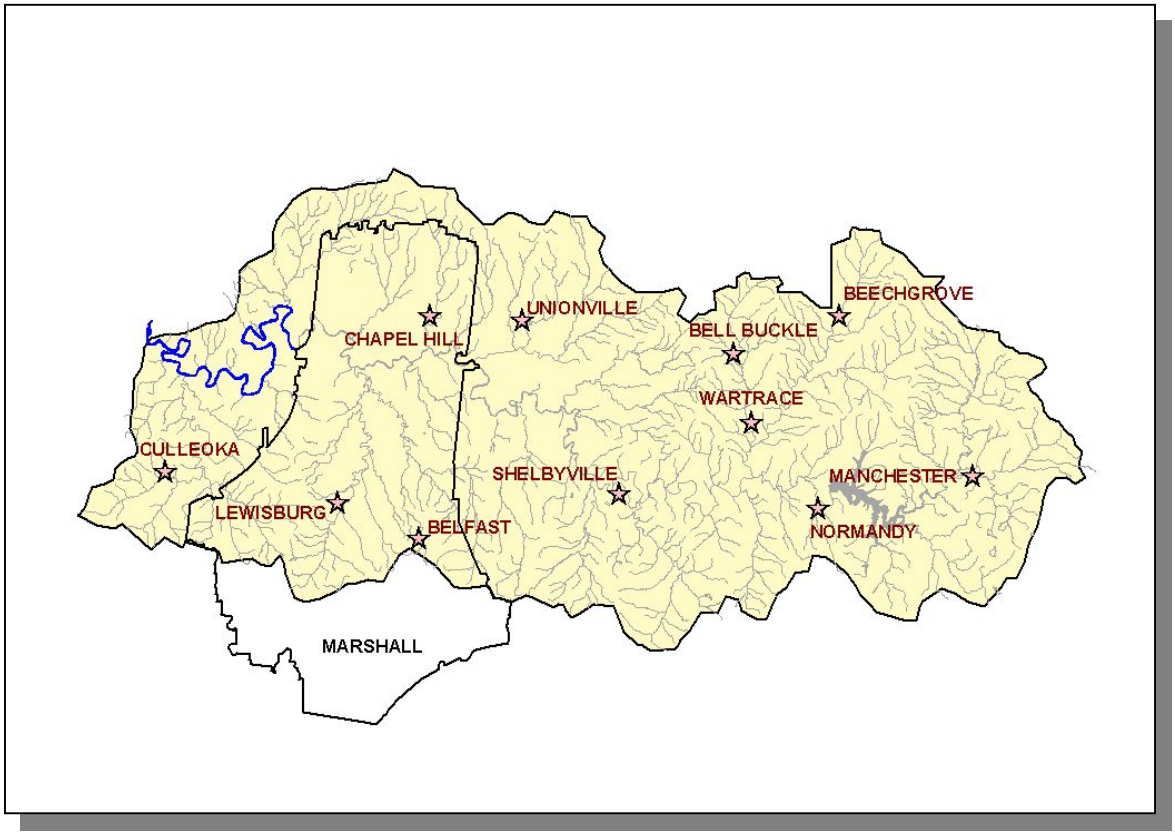

Figure 2-12. A Portion of the Upper Duck River is Designated as a State Scenic River. *Location of Beechgrove, Belfast, Bell Buckle, Chapel Hill, Culleoka, Lewisburg, Manchester, Normandy, Shelbyville, Unionville, and Wartrace are shown for reference.*

2.7.B. Greenways. The Upper Duck River Watershed has at least one greenways/trail:

- Little Duck River Greenway in Manchester

More information about greenways and trails in the watershed may be found at:

http://www2.state.tn.us/tdec/GREENWAYS/tnmap.htm

2.7.C. Interpretive Areas. Some sites representative of the natural or cultural heritage are under state or federal protection:

- Arnold Engineering Development Center is part of the Arnold Air Force Base. Commissioned in AEDC is the largest and most complex collection of flight simulation test facilities. The site is managed by the U.S. Air Force.
- Henry Horton State Park is an 1,140-acre park situated on the estate of the late Henry Horton, 36th governor of Tennessee. The park is located on the shores of the Duck River and is managed by the state of Tennessee.
- Normandy Hatchery was established as a partnership between TVA and TWRA. This 200-acre warm water hatchery is located south of Normandy Dam and is managed by the Tennessee Wildlife Resources Agency.
- Old Stone Fort Archaeological Area is a 200-year old Native American ceremonial site. A combination of mounds, walls, cliffs and rivers form a 50-acre enclosure. The site is managed by the state of Tennessee.

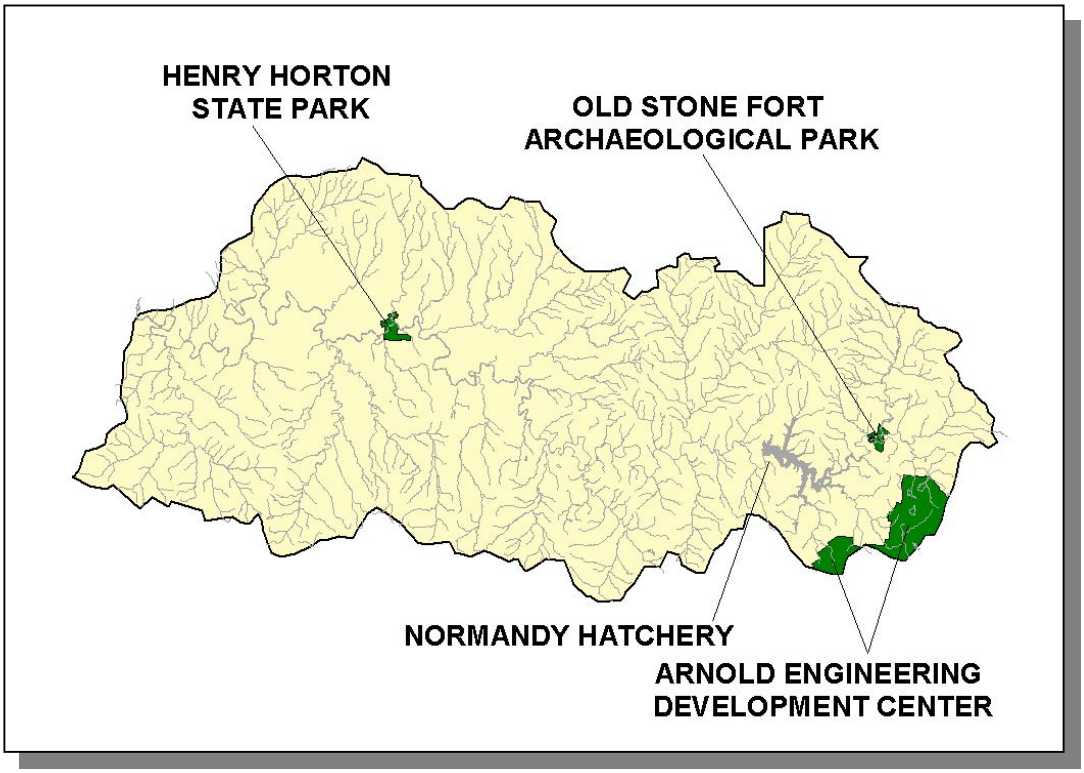

Figure 2-13. Locations of State- and Federally-Managed Lands in the Upper Duck River Watershed.

2.7.D. Wildlife Management Area. The Tennessee Wildlife Resources Agency manages five wildlife management areas in the Upper Duck River Watershed.

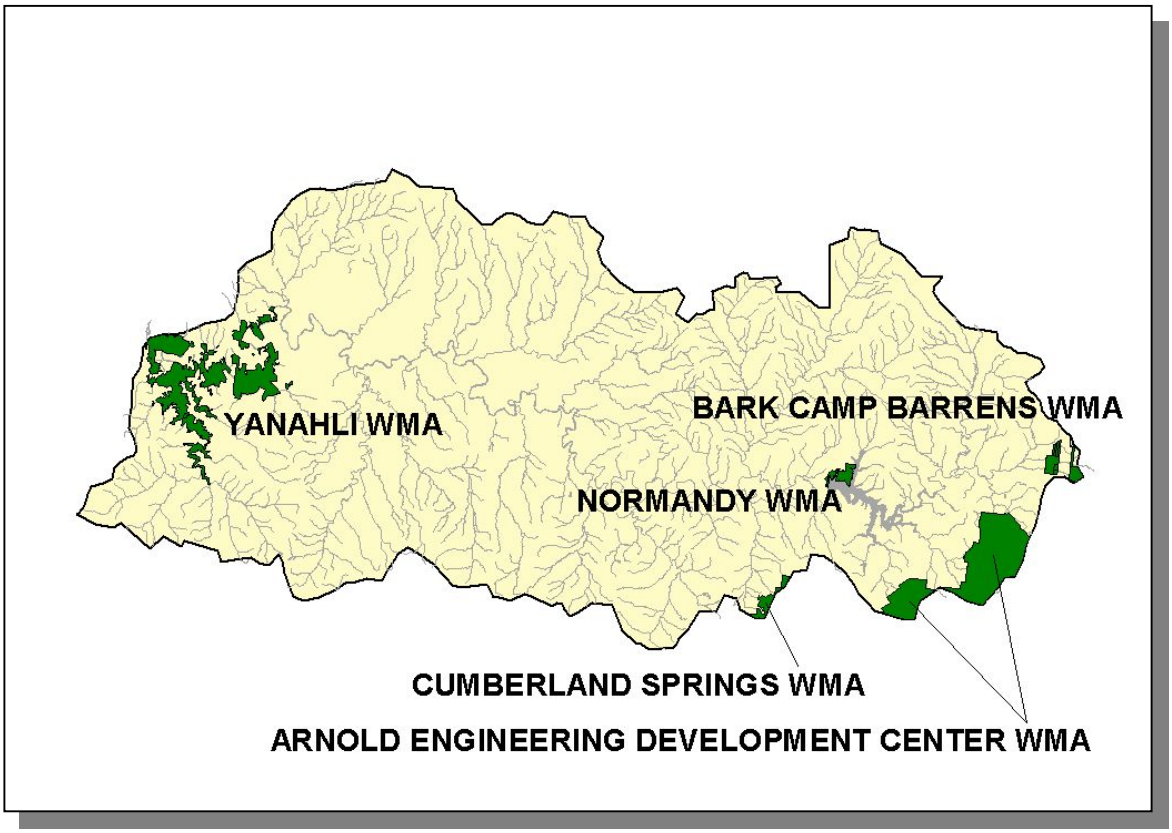

Figure 2-14. TWRA Manages Wildlife Management Areas in the Upper Duck River Watershed.

2.8. Tennessee Rivers Assessment Project. The Tennessee Rivers Assessment is part of a national program operating under the guidance of the National Park Service's Rivers and Trails Conservation Assistance Program. The Assessment is an inventory of river resources, and should not be confused with "Assessment" as defined by the Environmental Protection Agency. A more complete description can be found in the Tennessee Rivers Assessment Summary Report, which is available from the Department of Environment and Conservation and on the web at:

http://www.state.tn.us/environment/wpc/publications/riv/

STREAM	NSQ	RB	RF		STREAM	NSQ	RB	RF
Alexander Creek	3				Little Hurricane Creek	3		
Beaverdam Creek	2				Mill Creek	3		1
Benford Creek	3				New Lake Branch Big Rock Creek	4		
Big Rock Creek	3,4				Noah Fork Creek	3		
Bobo Creek	2				North Fork Creek	3	3	2
Brewer Creek	1				Oppossum Creek	2		
Caney Creek	3				Ovoca Creek	3		
Crumpton Creek	1	2	3		Rich Creek	2		
Daddy Creek	2				Riley Creek	2		
Dry Branch Big Rock Creek	3				Rock Creek	3	2	
Duck River	2,3,4	2	1,2		Shipman Creek	3		
East Fork Spring Creek	4				Silver Creek	2		
East Rock Creek	2	2			Sinking Creek	4		2
Fall Creek	3	3			Snake Creek			
Flat Creek	3		2		South Fork Flat Creek			
Fountain Creek	3		2		Spring Creek	3		
Garrison Fork Creek	3	3	1,2		Sugar Creek	3		
Globe Creek	3				Taylor Branch North Fork Creek	3		
Huckleberry Creek	2				Thick Creek	3		
Hunt Creek	4				Thompson Creek	3		
Hurricane Branch Fall Creek	3				Wartrace Ceeek	3		
Hutton Creek	3				Weakly Creek	3		
Lick Creek	3				Wilson Creek	3		
Little Duck River	2	3			Wolf Creek	2		
Little Flat Creek	4				Wright Branch Big Rock Creek	3		

Table 2-5. Stream Scoring from the Tennessee Rivers Assessment Project in the Upper Duck River Watershed.

Categories: NSQ, Natural and Scenic Qualities
RB, Recreational Boating
RF, Recreational Fishing

Scores: 1. Statewide or greater Significance; Excellent Fishery
2. Regional Significance; Good Fishery
3. Local Significance; Fair Fishery
4. Not a significant Resource; Not Assessed